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(54) Papermachine clothing

Papiermaschinenbespannung

Habillage pour machine à papier

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Description

The present invention relates to papermachine clothing comprising partially fused particles.

A suitable particulate material can be partially fused by means of a high energy input to give a structure containing a multitude of interstices. When heated above their crystalline melting point, the particles do not fluidise, but adopt a viscoelastic form. The external shape of the individual particles is substantially retained so as to provide an array of continguously dispersed neighbouring particles. Usually for the successful partial fusion of polymers ultra high molecular weight materials (UHMW) must be used, a typical molecular weight being 3 to 9 x 10^6 g/mol. However, some materials such as polyurethane and thermoplastic polyurethane do not need to possess an ultra high molecular weight for successful partial fusion.

EP 0187967 describes papermachine clothing comprising a base cloth having a coating of a sintered product on one side thereof. The sintered product does not cover both sides of the base fabric. The base fabric is thus finely engineered so as to avoid marking of the paper. Such fabrics are made using long and arduous preparation techniques.

EP 0342171 describes a method of depositing particles and a binder system on a base fabric and relates to the product of EP 0187967. A resin particle/binder/solvent mixture is applied to a textile substrate. Significant costs and stringent health and safety regulations concerning storage, handling and disposal of solvents must be met, in addition to additional costs of raw materials. Further it is difficult to obtain a uniform distribution of particles on the textile substrate. This patent is only concerned with coatings and not with an integral sintered structure as in the present invention.

According to the present invention there is provided papermachine clothing made from partially fused particles and comprising a reinforcing structure embedded wholly within the partially fused particle structure. There is also provided papermachine clothing made from partially fused particles.

The fabrics of the invention can be made much more quickly than those made by the method of EP 0187967 and are thus relatively cheap to manufacture.

The particles are preferably polymeric, although other materials such as metals may be used.

This partially fused material exhibits greatly enhanced abrasion resistance. The machine side of the material may be grooved to increase the hydraulic differential between the paper face of the fabric and the press roll and to aid instalment of the fabric on the machine where the papermachine suction box surfaces are grooved.

Preferred polymers for partial particle fusion include polyalkenes such as polyethylene and polypropylene, polyurethane, thermoplastic polyurethane or EPDM (ethylene propylene diene monomer). One example polymer is the Hostalon GUR (trade Mark of Hoechst AG) range of UHMW polyethylene having a molecular weight of 3.2 to 8 x 10^6 g/mol. Another example is the Goodrich product 58810 (TM) which has a shore hardness of 90.

A sheet of partially fused polymer may be prepared by evenly spreading the polymer powder into a layer of uniform thickness of typically 3 to 4 mm and then heating the polymer. The uniform polymer layer may be obtained by using a roller or blade. Alternatively the polymer powder may be moulded to the desired thickness. The layer of polymer is heated to say 230° to 240° for a time period in the order of 1.9 mins per mm of sheet thickness, allowing for shrinkage due to partial fusion forces. Continuous sheet production may involve distributing the powdered polymer onto a tensioned metal belt which passes through an oven where the belt is heated from above and underneath by IR heaters to facilitate partial fusion. The finished product may be mechanically treated, e.g. by grinding to give a smooth finish.

Some materials such as thermoplastic polyurethanes on being subjected to a high energy input partially fluidise and partially adopt a viscoelastic form as previously described so as to provide a partially fused product having superior toughness.

Other materials do not fluidise to a significant extent. Such sheets of solely partially fused polymeric particles will have only one drawback in that each polymer particle is only bonded at its tangent. The force required to break these bonds will not be particularly great and therefore a partially fused sheet will readily shed polymeric particles when subjected to frictional or impact forces. A reinforcement structure may be embedded wholly within such materials. This may comprise fibres extending through the partially fused product. Alternatively the reinforcement may comprise a fabric such as a nonwoven fabric, a mesh fabric, a plain weave fabric or a random dispersion of chopped fibres.

Bonding or bicomponent fibres are preferred, the melting or softening point of which is greater than that of the polymeric particles. On a macro scale the fibres may be formed into yarns. The yarns may form a woven or nonwoven matrix.

An example bicomponent fibre is Danaklon ES-C (trade mark) which comprises a polyethylene core and a polypropylene sheath. The fibre has a high adhesion strength and a low bonding temperature of 135 to 145°C. An example bonding fibre is Dacron 134 (trade mark of DuPont) which is a polyethylene terephthalate fibre with a melting/softening point of 205°C. One particularly suitable fibre is polyamide 6, having a melting point of 235°C. A sheath core bicomponent fibre with a polyamide 6 sheath and polyamide 6:6 core may also be appropriate.

The permeability of the partially fused product may be improved by incorporating a blowing agent into the product during partial particle fusion or using a porous support medium (e.g. partially fused metal) to enable the partially fusible powder to be fluidised immediately prior

to melt bonding.

The particles may be layered in different size fractions to produce a pyramidal porosity profile and, therefore, a permeability gradient. The partially fused sheet may be coated with fluoropolymers to give an improved wipe-clean, hydrophobic surface particularly advantageous for preventing re-wet of papermachine clothing and reducing fabric contamination. An ormocer (organically modified ceramic) coating would confer significant abrasion resistance, with back-flushing of air being employed at the point of lick-up during coating application to ensure the permeability of the structure is maintained.

A hybrid needled felt/partially fused particle surface may be formed by partially embedding polymer particles in the fibrous surface to act as a foundation for the final partially fused layer.

A further advantage of this method is the ease of addition of pigments, for example, a marking such as a bar may be incorporated to aid alignment of fabrics on machines and a logo can easily be incorporated.

Claims

1. Papermachine clothing made from partially fused particles and comprising a reinforcing structure embedded wholly within the partially fused particle structure.

2. Papermachine clothing as claimed in claim 1, wherein the said particles are polymeric.

3. Papermachine clothing as claimed in claim 1 or claim 2, wherein the particles comprise a polyalkene, polyurethane or EPDM.

4. Papermachine clothing as claimed in claim 1, wherein the said particles comprise a metal.

5. Papermachine clothing as claimed in any preceding claim, wherein the side of the clothing operative to be located on the papermachine comprises grooves.

6. Papermachine clothing as claimed in any preceding claim, wherein the reinforcing structure comprises fibres extending through the mass of partially fused particles.

7. Papermachine clothing as claimed in any of claims 1 to 5, wherein the reinforcing structure comprises a fabric.

8. Papermachine clothing as claimed in any of claims 1 to 5, wherein the reinforcing structure comprises a random dispersion of chopped fibres.

9. Papermachine clothing as claimed in any preceding claim, wherein the reinforcing structure comprises fibres having a melting or softening point which is greater than that of said partially fused particles.

10. Papermachine clothing as claimed in any preceding claim, wherein the reinforcing structure comprises bonding or bicomponent fibres.

11. Papermachine clothing as claimed in any preceding claim, wherein the partially fused particles are layered in different size fractions.

12. Papermachine clothing as claimed in any preceding claim, having a fluoropolymer coating thereon.

13. Papermachine clothing as claimed in any preceding claim, having an ormocer coating thereon.

14. Papermachine clothing made from partially fused particles.

15. Papermachine clothing as claimed in claim 14, wherein said particles are polymeric particles.

16. Papermachine clothing as claimed in claim 14, wherein the particles comprise a member selected from the group consisting of polyalkene, polyurethane and EPDM.

17. Papermachine clothing as claimed in claim 14, wherein said particles comprise metal.

18. Papermachine clothing as claimed in claim 14, wherein the papermachine clothing has two sides and a machine side of the clothing comprises grooves.

19. Papermachine clothing as claimed in claim 14, wherein the partially fused particles are layered in different size fractions.

20. Papermachine clothing as claimed in claim 14, having a fluoropolymer coating applied on said papermachine clothing.

21. Papermachine clothing as claimed in claim 14, having an ormocer coating applied on said papermachine clothing.

Patentansprüche

1. Papiermaschinenbespannung aus angeschmolzenen Teilchen mit einer Verstärkungsstruktur, die in die Struktur aus angeschmolzenen Teilchen vollständig eingebettet ist.

2. Papiermaschinenbespannung nach Anspruch 1,

bei der die Teilchen polymer sind.

3. Papiermaschinenbespannung nach Anspruch 1 oder 2,
bei der die Teilchen aus Polyalken, Polyurethan oder EPDM bestehen.

4. Papiermaschinenbespannung nach Anspruch 1,
bei der die Teilchen aus Metall bestehen.

5. Papiermaschinenbespannung nach einem vorhergehenden Anspruch,
bei der die auf der Papiermaschine aufliegende Seite der Bespannung Rillen aufweist.

6. Papiermaschinenbespannung nach einem vorhergehenden Anspruch,
bei der die Verstärkungsstruktur durch Fasern gebildet ist, die sich durch die Masse der angeschmolzenen Teilchen hindurch erstrecken.

7. Papiermaschinenbespannung nach einem der Ansprüche 1 bis 5,
bei der die Verstärkungsstruktur durch ein Gewebe gebildet ist.

8. Papiermaschinenbespannung nach einem der Ansprüche 1 bis 5,
bei der die Verstärkungsstruktur aus regellos verteilten geschnitzelten Fasern besteht.

9. Papiermaschinenbespannung nach einem vorhergehenden Anspruch,
bei der die Verstärkungsstruktur durch Fasern gebildet ist, die einen höheren Schmelz- oder Erweichungspunkt haben als die angeschmolzenen Teilchen.

10. Papiermaschinenbespannung nach einem vorhergehenden Anspruch,
bei der die Verstärkungsstruktur durch Verbund- oder Bikomponenten-Fasern gebildet ist.

11. Papiermaschinenbespannung nach einem vorhergehenden Anspruch,
bei der die angeschmolzenen Teilchen in Schichten unterschiedlicher Korngröße angeordnet sind.

12. Papiermaschinenbespannung nach einem vorhergehenden Anspruch,
die eine Überzugsschicht aus Fluorpolymer aufweist.

13. Papiermaschinenbespannung nach einem vorhergehenden Anspruch,
die eine Überzugsschicht aus organisch modifizierter Keramik aufweist.

14. Papiermaschinenbespannung, hergestellt aus angeschmolzenen Teilchen.

15. Papiermaschinenbespannung nach Anspruch 14,
bei der die Teilchen polymere Teilchen sind.

16. Papiermaschinenbespannung nach Anspruch 14,
bei der die Teilchen aus einem Stoff der Gruppe bestehen, die durch Polyalken, Polyurethan und EPDM gebildet ist.

17. Papiermaschinenbespannung nach Anspruch 14,
bei der die Teilchen aus Metall bestehen.

18. Papiermaschinenbespannung nach Anspruch 14,
bei der die Bespannung zwei Seiten aufweist und eine Maschinenseite der Bespannung mit Rillen versehen ist.

19. Papiermaschinenbespannung nach Anspruch 14,
bei der die angeschmolzenen Teilchen in Schichten unterschiedlicher Korngröße angeordnet sind.

20. Papiermaschinenbespannung nach Anspruch 14,
die eine Überzugsschicht aus Fluorpolymer aufweist.

21. Papiermaschinenbespannung nach Anspruch 14,
die eine Überzugsschicht aus organisch modifizierter Keramik aufweist.

Revendications

1. Toile de machine à papier réalisée à partir de particules partiellement fondues et comprenant une structure de renforcement enrobée totalement à l'intérieur de la structure de particules partiellement fondues.

2. Toile de machine à papier selon la revendication 1, dans laquelle lesdites particules sont de type polymère.

3. Toile de machine à papier selon la revendication 1 ou la revendication 2, dans laquelle les particules comprennent un polyalcène, un polyuréthane ou EPDM (Monomère Ethylène Propylène Diène).

4. Toile de machine à papier selon la revendication 1, dans laquelle lesdites particules comportent un métal.

5. Toile de machine à papier selon l'une quelconque des revendications précédentes, dans laquelle le côté de la toile destiné à être situé en fonctionnement sur la machine à papier comprend des rainures.

6. Toile de machine à papier selon l'une quelconque des revendications précédentes, dans laquelle la structure de renforcement comprend des fibres s'étendant à travers la masse de particules partiellement fondues.

7. Toile de machine à papier selon l'une quelconque des revendications 1 à 5, dans laquelle la structure de renforcement comprend un tissu.

8. Toile de machine à papier selon l'une quelconque des revendications 1 à 5, dans laquelle la structure de renforcement comprend une dispersion aléatoire de fibres obtenues par loupe.

9. Toile de machine à papier selon l'une quelconque des revendications précédentes, dans laquelle la structure de renforcement comprend des fibres ayant un point de fusion ou d'amollissement qui est plus élevé que celui desdites particules partiellement fondues.

10. Toile de machine à papier selon l'une quelconque des revendications précédentes, dans laquelle la structure de renforcement comprend des fibres de liaison ou à deux composants.

11. Toile de machine à papier selon l'une quelconque des revendications précédentes, dans laquelle les particules partiellement fondues sont disposées par couche en fractions de tailles différentes.

12. Toile de machine à papier selon l'une quelconque des revendications précédents ayant un revêtement en polymère fluoré.

13. Toile de machine à papier selon l'une quelconque des revendications précédentes, ayant un revêtement ormocer (céramique modifiée organiquement).

14. Toile de machine à papier réalisée à partir de particules partiellement fondues.

15. Toile de machine à papier selon la revendication 14, dans laquelle lesdites particules sont des particules de polymère.

16. Toile de machine à papier selon la revendication 14, dans laquelle les particules comprennent un corps choisi dans le groupe comportant polyalcène, polyuréthane et EPDM.

17. Toile de machine à papier selon la revendication 14, dans laquelle lesdites particules comportent du métal.

18. Toile de machine à papier selon la revendication 14, dans laquelle la toile de machine à papier a deux côtés et dans laquelle un côté machine de la toile comporte des rainures.

19. Toile de machine à papier selon la revendication 14, dans laquelle les particules partiellement fondues sont disposées par couche en fractions de différentes tailles.

20. Toile de machine à papier selon la revendication 14, ayant un revêtement polymère fluoré appliqué sur ladite toile de machine à papier.

21. Toile de machine à papier selon la revendication 14, ayant un revêtement ormocer (céramique modifiée organiquement) appliqué sur ladite toile de machine à papier.